

A REVIEW OF THE GENUS *PARANYCTIOPHYLAX* TSUDA FROM
SULAWESI, PAPUA NEW GUINEA AND NORTHERN AUSTRALIA
(TRICHOPTERA: POLYCENTROPODIDAE)

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Abstract

Neboiss, A., 1994. A review of the genus *Paranyctiophylax* Tsuda from Sulawesi, Papua New Guinea and northern Australia (Trichoptera: Polycentropodidae). *Memoirs of the Museum of Victoria* 54: 191–205.

The genus *Paranyctiophylax* Tsuda in Sulawesi, Papua New Guinea, Bougainville Island and northern Australia is reviewed. Eleven new species are described, definitions of several established species are revised and distributional data added.

Introduction

Disparities within the genus *Nyctiophylax* Brauer, 1865, were discussed by Neboiss (1993) who redefined the genus and transferred 25 of its species to *Paranyctiophylax* Tsuda, 1942. The distribution of *Paranyctiophylax*, previously known only from Japan, was thus expanded into South-east Asia, New Guinea and Australia (Fig. 1) with a further three distinct species groups in Sri Lanka, Africa and North America. Six new species of *Paranyctiophylax* are described here from northern Australia, two from the Indonesian island of Sulawesi, two from Papua New Guinea and one from Bougainville I., which is the eastern-most occurrence of the genus. Other species are known from the Bassian province of south-eastern Australia (Neboiss, 1981) but this is south of an extensive faunal barrier created by a stretch of dry savannah south of Townsville (Keast, 1961) and consideration of these species is outside the scope of this paper.

The two east Asian species, *P. kisoensis* Tsuda and *P. digitatus* (Martynov), are distinct from the species from Sulawesi, New Guinea, northern Australia and Bougainville I. In the east Asian species the phallus is firm, distally protruding, and apically rounded, without internal spines. The known species from the Sunda Is to northern Australia are all characterised by having the phallic apparatus soft and membranous, generally retracted into the genitalic capsule. The phallus is more or less expandable and contains a set of internal chitinous spines or rods, the particular arrangement of which is species specific.

Sixteen species are discussed or described in this paper. Revised definitions are given for the two east Asian species, new records are added to

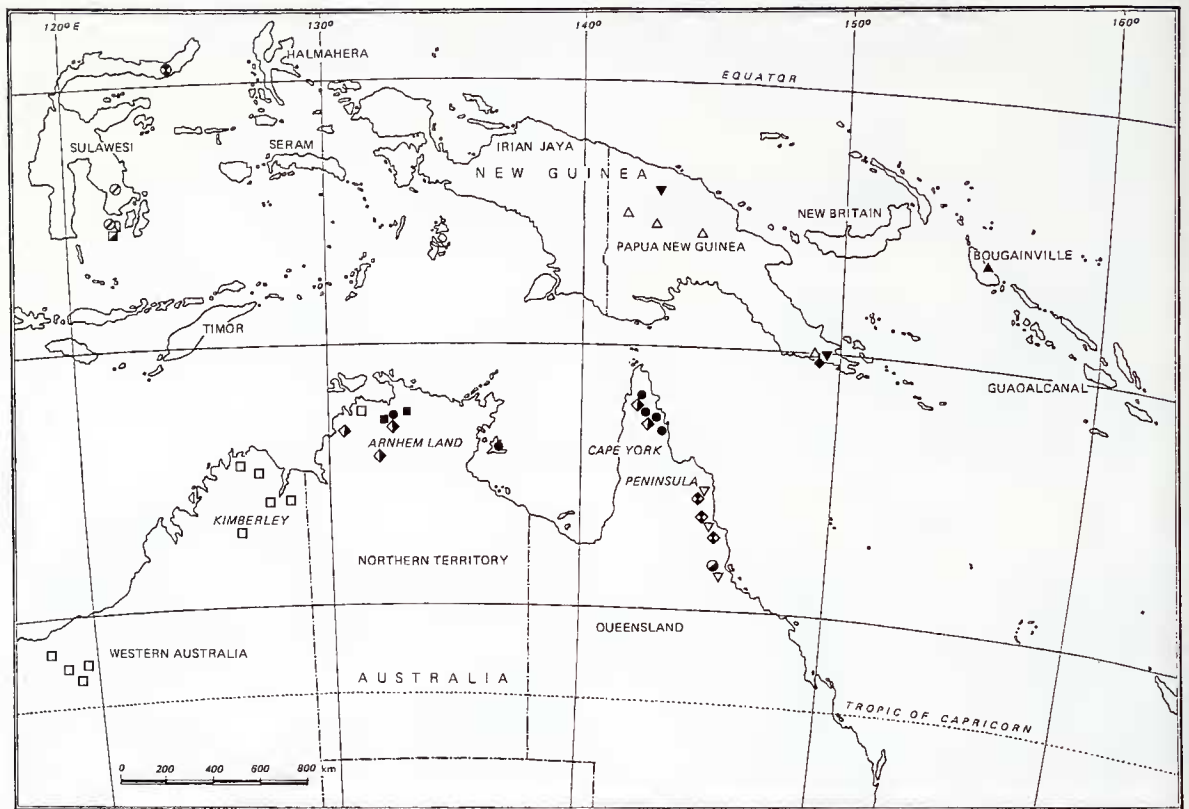
distributions of one New Guinean and one Australian species and 11 new species are described.

The east Asian species are *P. kisoensis* Tsuda from Japan (type species) and *P. digitatus* (Martynov) from Russia (Eastern Siberia).

The Sunda Islands – northern Australian species are *P. apicatus* sp. nov., Australia, Cape York; *P. basispinosus* sp. nov., Australia, North Queensland; *P. dicellatus* sp. nov., Australia, North Queensland; *P. eidolonus* sp. nov., Australia, North Queensland; *P. flavus* (Ulmer), Papua New Guinea; *P. gyratus* sp. nov., Papua New Guinea; *P. icelus* sp. nov., Indonesia, Sulawesi Tenggara; *P. kabaensis* sp. nov., Indonesia, Sulawesi Tenggara; *P. lumarius* (Neboiss), Indonesia, Sulawesi Utara; *P. parvus* (Mosely), Australia, Northern Territory; *P. rhamphodes* sp. nov., Australia, Northern Territory; *P. synorius* sp. nov., Bougainville Island; *P. spiculatus* sp. nov., Australia, North-west Australia; and *P. traunensis* sp. nov., Papua New Guinea.

Material and methods

All specimens are preserved in 75% ethanol unless stated otherwise. Illustrations have been prepared from abdomens cleared in cold KOH solution, then transferred to glycerol for drawing and later storage in microvials. Drawings of genitalia were made with the assistance of a camera lucida mounted on a Wild M20 compound microscope and wings were prepared as temporary microscope mounts in glycerol and drawn from a Wild M8 dissecting microscope with the aid of a camera lucida. The wing colours in all specimens preserved in alcohol show various degrees of fading. All dissected specimens are identified by the author's notebook number with prefix PT on a yellow label.



● *P. apicatus*

▣ *P. kabaensis*

◐ *P. basispinosus*

⊗ *P. lumarius*

▽ *P. dicellatus*

◆ *P. parvus*

◈ *P. eidolonus*

■ *P. rhamphodes*

▼ *P. flavus*

▲ *P. synorius*

◆ *P. gyratus*

□ *P. spiculatus*

⊖ *P. icelus*

△ *P. traunensis*

Figure 1. Distribution of *Paranyctiophylax* species described in this paper.

The following abbreviations have been used to designate the depository institutions: ANIC, Australian National Insect Collection, Canberra, Australia; BPBM, Bernice P. Bishop Museum, Honolulu, USA; NMV, Museum of Victoria, Melbourne, Australia; NTMD, Northern Territory Museum, Darwin, Australia; QM, Queensland Museum, Brisbane, Australia; RMNH, National Natural History Museum, Leiden, The Netherlands; UOJ, University of Osaka, Japan; ZMSP, Zoological Museum, State University, St Petersburg, Russia.

Paranyctiophylax Tsuda

Paranyctiophylax Tsuda, 1942: 265. — Neboiss, 1993: 108.

Type species. Paranyctiophylax kisoensis Tsuda, 1942 (by original designation).

Revised generic diagnosis. Fore wing cross-vein C-Sc basad of base of discoidal cell, fork 1 absent, fork 3 present, petiolate, anal veins looped, junction of A2 and A3 close to or merged with junction to A1; hind wing forks 1 and 3 absent (aberrantly a small fork 3 may be present), discoidal cell short, triangular, cell at base of anal veins A2 and A3 extended towards wing margin, cross-vein closing cell distinctly separated from cross-vein Cu2-A1.

Male genitalia with superior appendages moderately large, arising distad of upper angle of sternite IX; paraproctal processes conspicuous, robust, directed posteriorly or curved ventrad; inferior appendages moderately long, slender, curved dorsad.

Female genitalia with tergite VIII large, sternite VIII broad, ventral plates attached basolaterally.

EAST ASIAN SPECIES

Diagnostic features. Apex of phallus protruding distally, firm, tip rounded, internal spines absent, with or without parameres.

Paranyctiophylax kisoensis Tsuda, 1942

Figures 2, 3

Paranyctiophylax kisoensis Tsuda, 1942: 265. — Neboiss, 1993: 108.

Type material. 6 ♂ Japan, Otakigawa-hontani, Kiso, Nagano, 4 Aug 1939, M. Tsuda (type not seen).

Material examined. 1 ♂, Japan, Jadani, Hakusan, 31 Aug 1981, K. Tanida (UOJ).

Revised diagnosis. Colour blackish-brown, wing venation as in Fig. 3. Length of fore wing ♂ 6.5–6.7 mm.

Male genitalia (Fig. 2) with sternite IX small, in lateral view about as long as high without mesoventral projection; superior appendages robust, subtriangular; paraproctal processes short, broad at base, apex rounded; inferior appendages moderately robust. Phallus protruding distally, apex firm, dark blackish-brown.

Female not described.

Distribution. Japan.

Remarks. This species is distinguished from *P. digitatus* by the presence of parameres and the shapes of sternite IX, the superior appendages and the paraproctal processes.

Paranyctiophylax digitatus (Martynov, 1934)

Figure 4

Nyctiophylax digitatus Martynov, 1934: 241.

Paranyctiophylax digitatus. — Neboiss, 1993: 108.

Type material. Holotype ♂, Russia, South Ussurian Kray, Vinogradovka, 5 Jul 1929, Kirichenko (ZMSP) (examined). Paratype 1 ♂ collected with holotype (♂ genitalie prep. PT-1967 figured).

Revised diagnosis. Colour in dry specimen greyish-brown, distinct pale hyaline angular spot at base of median cell. Length of fore wing ♂ 6.0 mm; (length of body 4–4.5 mm given by Martynov).

Male genitalia (Fig. 4) with sternite IX in lateral view about as long as high with stout mesoventral projection; superior appendages short, bluntly rounded apically; paraproctal processes short, rather broad, only slightly broader at base, apex truncate; inferior appendages slender, pointed apically, with basal elbow slightly produced. Phallus protruding distally beyond superior appendages, apex firm, dark blackish-brown.

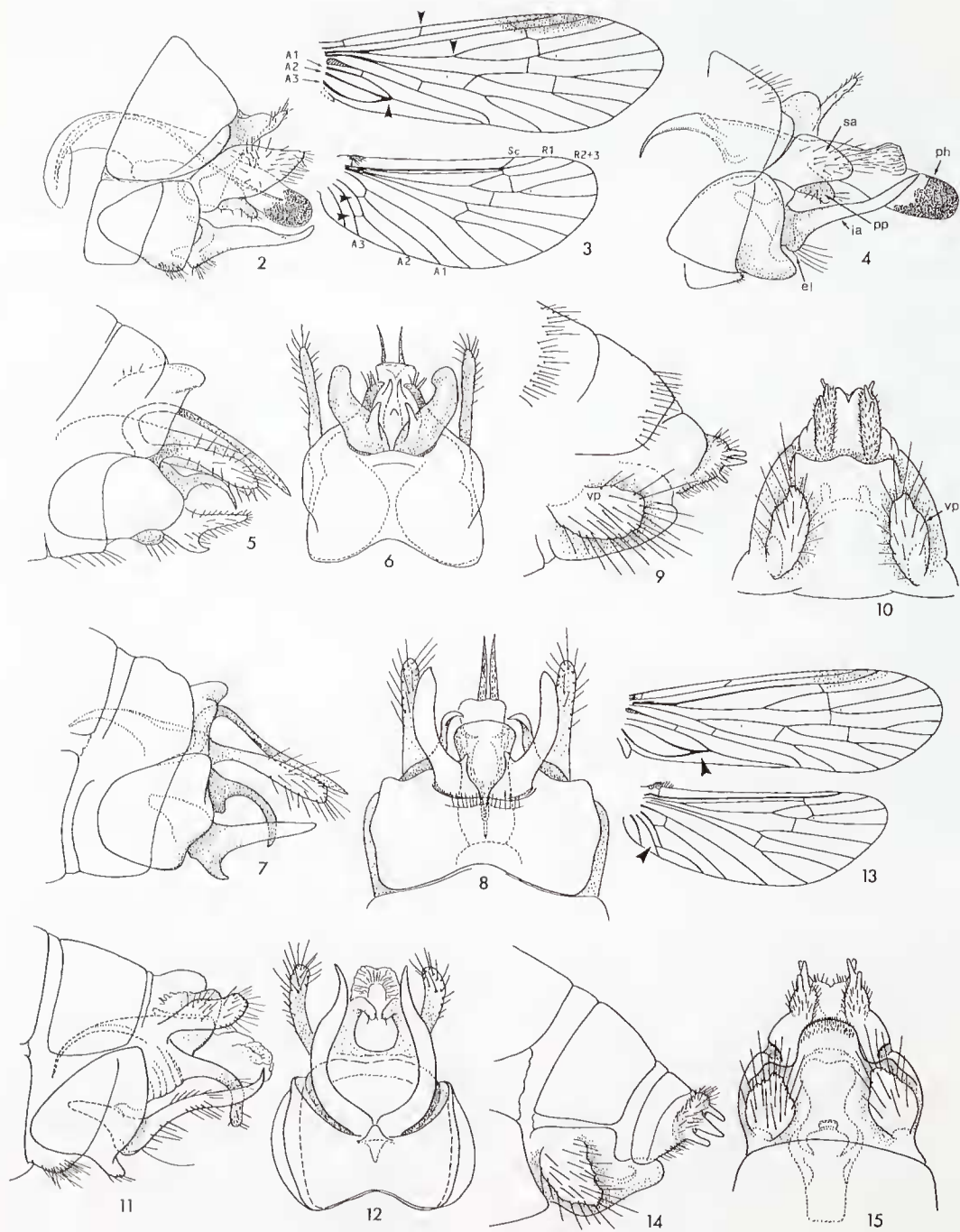
Female: In the original description the female is noted as having 'end of abdomen blackish', but no female specimens are included in the type material.

Distribution. Russia (Siberian far south-east).

Remarks. Males of this species are distinguished from *P. kisoensis* by the smaller superior appendages, the apically truncate paraproctal processes and the shape of sternite IX.

THE SUNDA ISLANDS - NORTHERN AUSTRALIAN SPECIES

Diagnostic features. Phallic apparatus membranous, not protruding distally; with internal or sometimes external chitinous spines or rods; parameres absent.



Paranyctiophylax lumarius (Neboiss, 1989)

Figures 5, 6

Nyctiophylax lumarius Neboiss, 1989: 107.*Paranyctiophylax lumarius* – Neboiss, 1993: 108.

Type material. Holotype ♂, Indonesia, Sulawesi Utara, Dumoga Bone National Park, Edwards camp near Tumpah R., 00°35'N, 123°51'E, 650 m asl, 22 May 1985. A. Wells (NMV). Paratypes: 10 ♂ collected with holotype (♂ genitalic prep. PT-1558 figured) (NMV, RMNH).

Distribution. Indonesia, Sulawesi Utara.

Remarks. The statement in the original description (Neboiss, 1989) that the 'preanal appendages are formed by three processes' requires amendment. The three processes arise separately, and of these the middle processes should be regarded as superior appendages. The upper processes arise from the upper inner margin of sternite IX, rapidly curve mesad and then distad just above the phallus and may correspond to the intermediate appendages (Holzenthal and Hamilton, 1988). The lower processes correspond to the paraproctal processes of species like *P. icelus*, however, in *P. lumarius* they are not fused mesally below the phallus. The inferior appendages show similarities to *P. hjangsanichonus* (Botosaneanu, 1970) of Korea but the form of the superior appendages is distinct. The female is unknown. No new material was available for study.

Paranyctiophylax kabaensis sp. nov.

Figures 7–10

Type material. Holotype ♂, Indonesia, Sulawesi Tenggara, Pulau Kabaena, 4 km S of Tangkeno, 05°18'S, 121°57'E, 300 m asl, 4 Nov 1989, at light, R. de Jong and J. Huisman (site JS 8932) (RMNH). Paratypes: 2 ♂s, 1 ♀ collected with holotype (RMNH, NMV) (♀ genitalic prep. PT-1961

figured); 1 ♂ same locality 5 Nov 1989, at light (site JS 8933); 1 ♂ same locality 7 Nov 1989, at light (site JS 8937) (RMNH); 3 ♂ 3 ♀ Sulawesi Tenggara, Pulau Kabaena, Batuawu, 05°25'S 121°48'E, 11 Nov 1989, at light, R. de Jong and J. Huisman (site JS 8945) (RMNH, NMV) (♂ genitalic prep. PT-1956 figured).

Description. Colour blackish-brown, similar in both sexes. Length of fore wing ♂ 3.5–4.3 mm; ♀ 4.3–5.1 mm.

Male genitalia (Figs 7, 8) similar to *P. lumarius* but differs in details. Abdominal sternite IX in lateral view about as long as high; superior appendages slender, somewhat obliquely truncate apically, paraproctal processes strongly curved dorsad, pointed apically. Inferior appendages more slender than in *P. lumarius*, pointed apically, mesoventral branch small. Phallus without internal bars or spines.

Female genitalia (Figs 9, 10) sternite VIII apically broad, distal margin shallowly trilobed.

Etyymology. Reference to the type locality.

Remarks. This species is very similar to *P. lumarius* but may be distinguished by the details of male genitalia, particularly the more elongate inferior appendages.

Paranyctiophylax icelus sp. nov.

Figures 11–15

Type material. Holotype ♂, Indonesia, Sulawesi Tenggara, Pulau Kabaena, 1 km S of Tangkeno, riverine forest, Sungai Lantinioli, 05°17'S, 121°57'E, 8 Nov 1989, at light, R. de Jong and J. Huisman (site JS 8939) (RMNH). Paratypes: 50 ♂, 1 ♀, collected with holotype (BPBM; NMV; RMNH) (♂ genitalic prep. PT-1911 figured); 5 ♂, 1 ♀, same locality 9 Nov 1989, (site JS 8940–42) (RMNH); 10 ♂, 25 ♀, 4 km S of Tangkeno, 4 Nov 1989, R. de Jong and J. Huisman (site JS 8932) (BPBM; NMV; RMNH) (♀ genitalic prep. PT-1957 figured); 15 ♂, 4 ♀, same locality 5 Nov 1989 (site JS 8933) (RMNH).

Figures 2, 3, *Paranyctiophylax kisoensis*, 2, male genitalia lateral; 3, male wing venation.

Figure 4, *P. digitatus*, male genitalia lateral.

Figures 5, 6, *P. lumarius*, 5, male genitalia lateral; 6 male genitalia ventral.

Figures 7–10, *P. kabaensis*: 7, male genitalia lateral; 8, male genitalia ventral; 9, female genitalia lateral; 10, female genitalia ventral.

Figures 11–15, *P. icelus*: 11, male genitalia lateral; 12, male genitalia ventral; 13, male wing venation; 14, female genitalia lateral; 15, female genitalia ventral.

ia, inferior appendage; el, elbow of inferior appendage; ph, phallus; pp, paraproctal process; sa, superior appendage; vp, ventral plate.

Other material examined. Indonesia, Sulawesi Tenggara, 6 ♂, 3 km S of Tangkeno, Pulau Kabaena, 350m asl, 6 Nov 1989 (site JS 8936) (RMNH); 1 ♂, same locality 7 Nov 1989 (site JS 8938) (RMNH); 2 ♂, 1 ♀, same locality 5 Nov 1989 (site JS 8934) (RMNH); 9 ♂, 7 ♀, N slope Gunung Watuwila, Mokowo R., 03°48'S, 121°39'E, 250–1100m asl, 11–19 Oct 1989 (site JS 8902) R. de Jong and J. Huisman (NMV; RMNH).

Description. Fore wing with median cell closed, venation as in Fig. 13. Length of fore wing: ♂ 4.0–4.6mm; ♀ 4.4–5.3mm.

Male genitalia (Figs 11, 12), abdominal sternite IX in lateral view short, subtriangular, with distomesal projection; superior appendages elongate, slender; paraproctal process long, curved ventrad, apices bluntly rounded; inferior appendages slender, pointed apically. Phallus with small internal chitinous spine.

Female genitalia (Figs 14, 15) ventral plates small, sternite VIII, in ventral view with broad, rounded mesal lobe.

Etymology. From *ikelos* (Greek), 'like' referring to the similarity of species in Australia.

Remarks. The species is distinguished from other Sulawesi species by the slender inferior appendages, acute apically, and by the shape of superior appendages.

Paranyctiophylax parvus (Mosely)

Figures 16–19

Nyctiophylax parvus Mosely in Mosely and Kimmins, 1953: 357, fig. 246.

Paranyctiophylax parvus. — Neboiss 1993: 108.

Type material. Holotype ♂, Australia, Northern Territory, Manbulla Station (=Manbulloo) 14°31'S, 132°12'E, 19 Jul 1929, Mackerras and Campbell (ANIC) (type not seen).

Material examined. Australia, Northern Territory, 1 ♂, South Alligator R. at Gimbat, 13°34'S, 132°37'E, 24 May 1988, light trap, A. Wells and P. Suter (♂ genitalic prep. PT-1816 figured) (NMV); 1 ♂, Litchfield National Park, Tolmer Falls, 13°12'S, 130°43'E, MV-light, 4 Sept 1992, A. Wells and J. Webber (NTMD).

North Queensland, Cape York: 1 ♂, Gunshot Creek — Telegraph x-ing, 11°44'S, 142°29'E, 14 Feb 1992, D. Cartwright and A. Wells (QM); 2 ♂, Bertie Creek, 1 km SE Heathlands H.S., 11°34'S, 142°35'E, 4 Feb 1992, D. Cartwright and A. Wells (NMV); 3 ♂, Tributary of Bertie Creek 250m SW Heathlands H.S., 4 Feb 1992, D. Cartwright and A. Wells (QM); 1 ♂, 1 ♀, same locality 11 Feb 1992, D. Cartwright and A. Wells (NMV) (♀ genitalic prep. PT-1973 figured); 2 ♂, Eliot Creek above Canal Creek junction, 11°23'S, 142°25'E, 6 Feb 1992, D. Cartwright and A. Wells (QM); 2 ♂, Middle Claudie R., Iron Range, 12°46'S, 143°16'E, 2–9 Oct 1974, M. S. Moulds (NMV); 1 ♂, same

locality 23 Oct 1974, M. S. Moulds (NMV); 1 ♂, 2 ♀, 6 km ENE Mt Tozer, 12°44'S, 143°16'E, 30 Jun 1986, J. C. Cardale (ANIC; NMV); 4 ♂, 3 km ENE Mt Tozer, 2 Jul 1986, J. C. Cardale (ANIC); 1 ♂, 9 km ENE Mt Tozer, 5–10 Jul 1986, J. C. Cardale (ANIC); 1 ♂, Heathlands, 11°45'S, 142°35'E, 18 Aug 1992, at light, J. C. Cardale and P. Zborowski (ANIC).

Distribution. Originally described from a single male specimen from Northern Territory, Australia, it is now recorded from several localities on Cape York Peninsula.

Remarks. Males of this species (Figs 16, 17) are easily distinguished by the apically truncate superior appendages, robust, apically pectinate inferior appendages, and strongly formed paraproctal processes. The phallus has a pair of curved spines. Female genitalia are as illustrated (Figs 18, 19), the sternite VIII with a distinct mesoventral keel, distal margin produced mesally into a distinct rounded lobe; and ventral plates rather elongate ovoid.

Paranyctiophylax gyratus sp. nov.

Figures 20–25

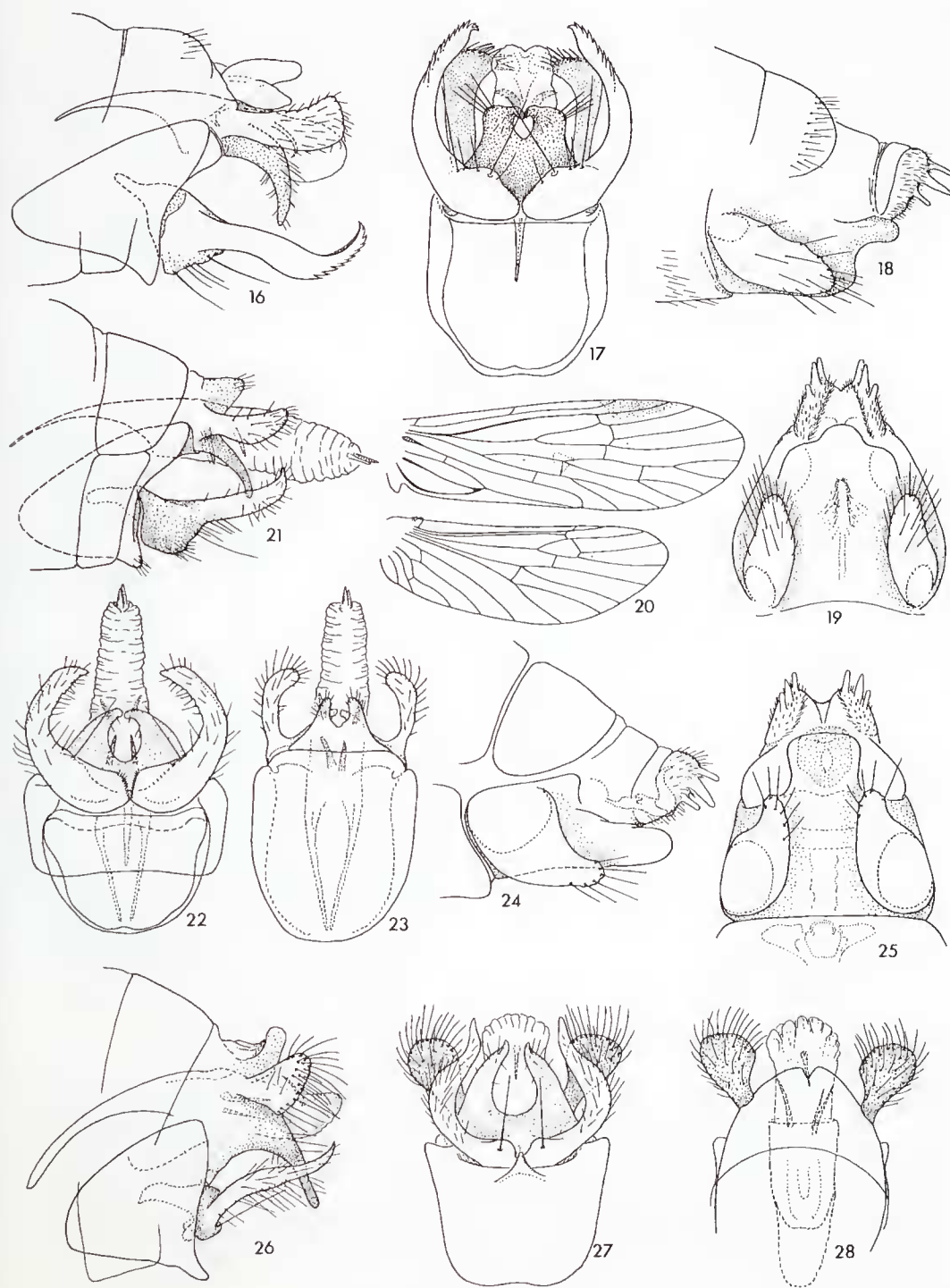
Type material. Holotype ♂, Papua New Guinea, Mamai Plantation, 10°16'S, 149°30'E, 150m asl., 6 Feb 1965, R. Straatman (BPBM) (♂ genitalic prep. PT-1785, specimen dry mounted). Paratypes: 1 ♂, 1 ♀, collected with holotype (BPBM); 2 ♀, same locality 27 Jan 1965, R. Straatman (BPBM, NMV) ♀ genitalic prep. PT-1965 figured, specimen in alcohol; 1 ♂ 2 ♀ same locality 29 Jan 1965, R. Straatman (BPBM, NMV) (♂ genitalic prep. PT-1952 figured, specimen in alcohol); 1 ♀, same locality 30 Jan 1965, R. Straatman (BPBM) (dry mounted).

Description. Colour of wings dark-greyish brown with obvious, somewhat triangular pale gray spot at base of median cell and small spot at arculus, venation as in Fig. 20. Length of fore wing: ♂ 3.6–3.7mm; ♀ 3.8–4.6mm.

Male genitalia (Figs 21–23) characteristic of genus; sternite IX subtriangular, mesoventral projection short; superior appendages elongate; paraproctal processes slightly wider at base, apices bluntly rounded; inferior appendages robust, broad at base, in ventral view evenly curved. Phallus with pair of apical chitinous spines and 2 pairs at base.

Female genitalia (Figs 24, 25) sternite VIII in ventral view broadly rectangular at apex, ventral plates broad at base, abruptly narrowed distally, apices rounded.

Distribution. South-eastern Papua New Guinea.



Figures 16–19, *Paranyctiophylax parvus*: 16, male genitalia lateral; 17, male genitalia ventral; 18, female genitalia lateral; 19, female genitalia ventral.

Figures 20–25, *P. gyratus*: 20, male wing venation; 21, male genitalia lateral; 22, male genitalia ventral; 23, male genitalia dorsal; 24, female genitalia lateral; 25, female genitalia ventral.

Figures 26–28, *P. flavus*: 26, male genitalia lateral; 27, male genitalia ventral; 28, male genitalia dorsal.

Etymology. From *gyrata* (Latin), 'turning around' in reference to the shape of the inferior appendages in ventral view.

Remarks. Males may be distinguished by the robust inferior appendages, and females by the broad rectangular sternite VIII.

***Paranyctiophylax flavus* (Ulmer, 1915)**

Figures 26–28

Nyctiophylax flavus Ulmer, 1915: 45. — Ulmer, 1930: 424. — Ulmer, 1951: 122.

Paranyctiophylax flavus. — Neboiss, 1993: 108.

Material examined. 1 ♂, Papua New Guinea, Mamai Plantation, E of Port Glasgow, 10°16'S, 149°30'E, 150 m asl, 27 Jan 1965, R. Straatman (NMV) (♂ genitalie prep. PT-1487 figured, specimen dry mounted).

Distribution. Papua New Guinea.

Remarks. The original material (1 ♂, 3 ♀) from the 'Kaiserin-Augusta-Fluss Expedition' (present day Sepik River, Papua New Guinea) was collected at the base camp, Malu village (04°15'S, 142°53'E) about 100 m asl. None of this material has been located either at Berlin Museum, or in the Ulmer Collection, Hamburg. In the absence of type material and with insufficient details in the original illustrations, the species identity is somewhat uncertain. A specimen from Mamai Plantation, about 1000 km south-east of the type locality, is here identified as this species, although with some reservation. The wing venation agrees with the described details, fore wing fork 4 and hind wing fork 2 are both sessile. Some details of male genitalia (Figs 26–28) appear slightly different, but this may be due to the original illustrations being prepared from a dried specimen. The tergite X (IX of Ulmer) is cleft apically, the superior appendages (appendages preanales of Ulmer) are proportionally smaller, the mesal spine (ein Dorn) is actually at the apex of the phallus and in dried specimen may protrude distally. Although three female specimens were collected within the original material, they are neither described nor figured. No new female specimens were avail-

able for study. The length of fore wing of males is 4.0–4.6 mm.

The species is distinguished by the pale straw-yellow wing colour, the short and broad, rounded superior appendages and the mesal spine at the distal end of the phallus. The illustrations referred to *Paranyctiophylax flavus* by Neboiss 1993 represent *Paranyctiophylax gyratus* described in this paper.

***Paranyctiophylax eidolonus* sp. nov**

Figures 29–33

Type material. Holotype ♂, Australia, North Queensland, Upper Freshwater Creek, Whitfield Range nr Cairns, 16°56'S, 145°42'E, 24 Aug 1974, M. S. Moulds (NMV, T-12296). Paratypes: 9 ♂, 4 ♀, collected with the holotype (NMV) (♂ genitalie prep. PT-1977 figured); 4 ♂, 2 ♀, same locality, 15 Dec 1974, M. S. Moulds (ANIC; NMV; QM); 4 ♂, same locality, 3 Apr 1975, M. S. Moulds (NMV); 40 ♂, 15 ♀, Mossman Gorge, Daintree National Park, 17 Nov 1988, K. Walker (♀ genitalie prep. PT-1996 figured) (BPBM; NMV; QM; RMNH); 5 ♂, Mulgrave River 8 km NW of Gordonvale, 15 Nov 1988, K. Walker (NMV); 2 ♂, 2 ♀, Crystal Cascades nr Cairns, 10 Jun 1971, E. F. Riek (ANIC; NMV) (dry mounted).

Other material examined. North Queensland, 3 ♂, Gap Creek, Mt Finlayson Range, S of Cooktown, 23 Nov 1974, M. S. Moulds (NMV); 3 ♂, Woobadda R., 15°58'S, 145°22'E, 25 Aug 1992, at light, J. C. Cardale and P. Zborowski (ANIC); 6 ♂, Behana Gorge nr Cairns, 17°11'S, 145°50'E, 16 Nov 1982, T. Hinger (NMV).

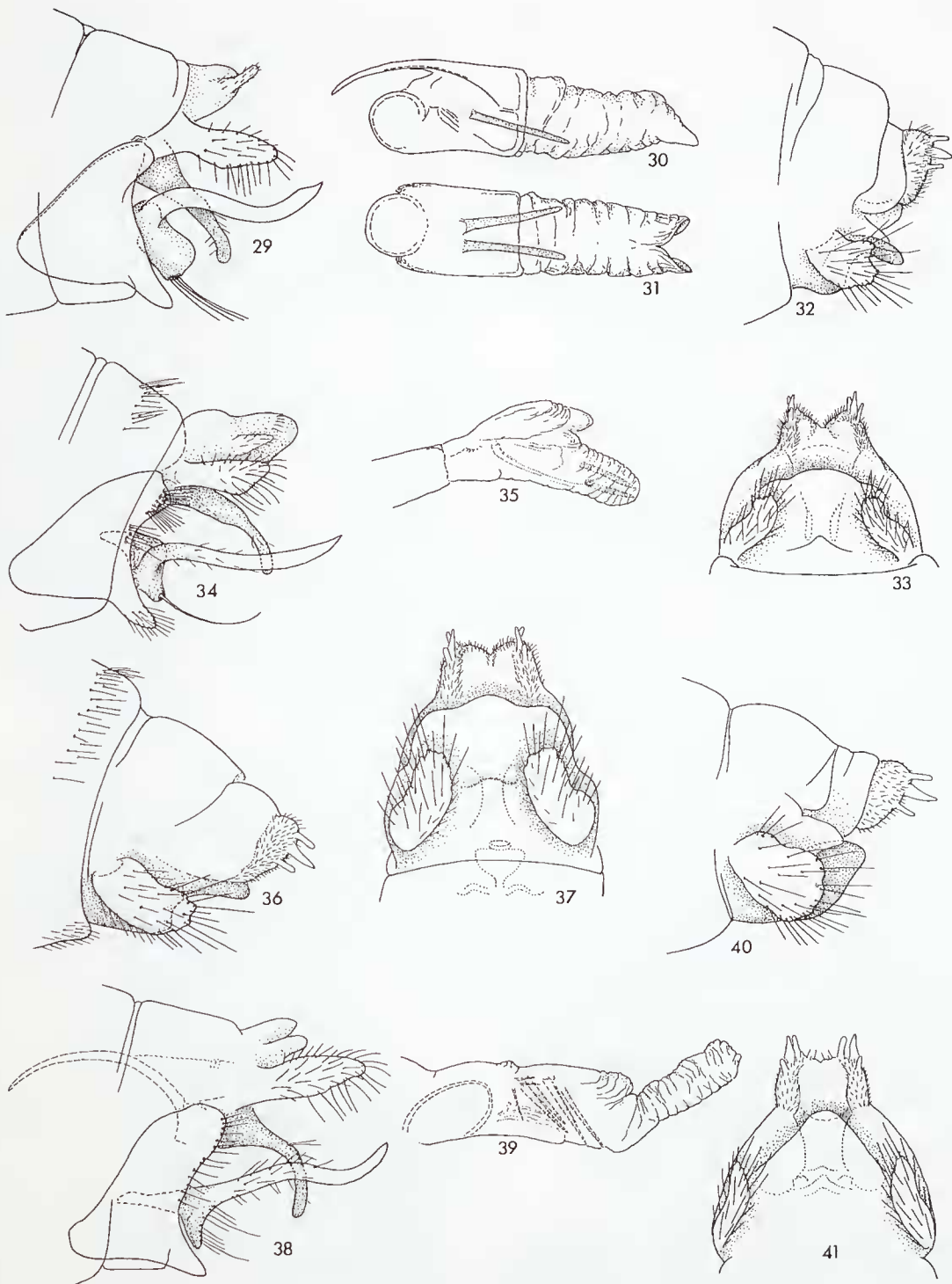
Description. Colour of wings dark greyish-brown, in dry specimens fore wings with dark costal margin as well as several dark spots on cross-veins and at bases of forks, also dark spot at arculus and at junction of anal veins. Wing venation similar to *P. flavus*, fore wing median cell closed. Length of fore wing: ♂ 4.2–5.2 mm; ♀ 4.9–5.5 mm.

Male genitalia (Fig. 29) characteristic of genus, sternite IX subtriangular, mesoventral projection in lateral view distinct; superior appendages elongate, rounded apically; paraproctal processes gradually widened near base, apices rounded; inferior appendages slender, curved, pointed apically, basal elbow distinct with several strong setae at base. Phallus (Figs 30, 31) terminating

Figures 29–33, *Paranyctiophylax eidolonus*: 29, male genitalia lateral; 30, phallus lateral; 31, phallus ventral; 32, female genitalia lateral; 33, female genitalia ventral.

Figures 34–37, *P. dicellatus*: 34, male genitalia lateral; 35, apex of phallus lateral; 36, female genitalia lateral; 37, female genitalia ventral.

Figures 38–41, *P. basispinosus*: 38, male genitalia lateral; 39, apex of phallus lateral; 40, female genitalia lateral; 41, female genitalia ventral.



in 2 triangular lobes apically, a pair of comparatively long chitinous rods near base.

Female genitalia (Figs 32, 33) sternite VIII short and broad, transversally concave, distal margin forming a downturned lip; ventral plates short, distal margin irregular.

Distribution. Australia, North Queensland.

Etymology. From *eidolon* (Greek), 'image', referring to the similarity with other species from northern Australia.

Remarks. Males can be readily distinguished by the strongly developed basal elbow of the inferior appendages and the distinct apex of phallus.

Paranyctiophylax dicellatus sp. nov.

Figures 34–37

Type material. Holotype ♂, Australia, North Queensland, Lock Creek, Davies Creek Rd, Lamb Range, Mareeba district, 16°59'S, 145°33'E, 25 Dec 1976, M. S. Moulds (NMV, T-10117). Paratypes: 3♂, collected with holotype (NMV); 1♂, Upper Freshwater Creek, Whitfield Range nr Cairns, 3 Apr 1975, M. S. Moulds (♂ genitalic prep. PT-1979 figured) (NMV); 1♂, Mulgrave R. W of Gordonvale, 29 Apr 1979, A. Wells (NMV); 1♂, Grass Tree Pocket Rd, Annan River, Cooktown area, 15°49'S, 145°14'E, 1 Jan 1981, G. Daniels (QM).

Other material examined. 1♂, Yuccabine Creek, Kirrama State Forest, 18°12'S, 145°45'E, 2 Jan 1985, R. Pearson (NMV).

Description. Colour dark greyish-brown, wing venation similar to *P. flavus*, fore wing median cell closed. Length of fore wing: ♂ 3.7–4.5 mm.

Male genitalia (Fig. 34) with distal margin of sternite IX in lateral view concave, mesoventral projection present; superior appendages obliquely truncate apically; paraproctal processes with basal half obviously thickened, apex rounded; inferior appendages gently curved, basal elbow with single strong bristle. Phallus (Fig. 35) apically with pair of dorsolateral expandable lobes and pair of internal chitinous spines.

Female (Figs 36, 37) from type locality provisionally referred to this species.

Distribution. Australia, North Queensland.

Etymology. From *dikella* (Greek), having two prongs, in reference to the pair of spines within the phallus.

Remarks. The species may be identified by the strong bristle at the base of the inferior appendages and the position of the chitinous spines within the phallus.

Paranyctiophylax basispinosus sp. nov.

Figures 38–41

Type material. Holotype ♂, Australia, North Queensland, Yuccabine Creek, Kirrama State Forest, 18°12'S, 145°45'E, 2 Jan 1982, R. Pearson (NMV, T-10123). Paratypes: 2♂, 1♀, collected with holotype (NMV); 1♀, same locality, 3 Feb 1985 (♀ genitalic prep. PT-1958 figured) (NMV); 1♂, same locality, Oct. 1984, R. Pearson (NMV); 2♂, 1♀, same locality, Dec 1985, R. Pearson (NMV); 2♂, 1♀, same locality, Mar 1986, R. Pearson (♂ genitalic prep. PT-1589 figured) (NMV; QM); 1♀, Yuccabine Creek, 18°13'S, 145°45'E, 1982 (NMV).

Description. Colour dark greyish-brown, wing venation similar to *P. flavus*, fore wing median cell closed. Length of fore wing: ♂ 4.7–5.3 mm; ♀ 5.4–6.2 mm.

Male genitalia (Fig. 38) with sternite IX short, dorsal margin in lateral view comparatively broad, mesoventral projection present; superior appendages elongate ovate; paraproctal processes in lateral view expanded near base, apices rounded; inferior appendages slender, elongate curved, basal elbow not very obvious. Phallus (Fig. 39) with group of basal, ventrally directed internal spines, apex membranous.

Female genitalia (Figs 40, 41) with sternite VIII ventrally convex, in ventral view broadly triangular; ventral plates broad, attached sublaterally.

Distribution. Australia, North Queensland.

Etymology. References to the position of the group of spines within the phallus.

Remarks. Males of this species are distinguished by the reduced basal elbow of the inferior appendages and the group of chitinous internal spines at the base of the phallus.

Paranyctiophylax rhamphodes sp. nov.

Figures 42–46

Type material. Holotype ♂, Australia, Northern Territory, South Alligator R. above BHP camp, MV-light, 25 May 1988, A. Wells and P. Suter (NMV, T-10766). Paratypes: 1♂, collected with holotype (♂ genitalic prep. PT-1948 figured) (NMV); 1♂, South Alligator R. below BHP camp, 25 May 1988, A. Wells and P. Suter (NMV); 1♂, South Alligator R. below Fisher Creek junction, 24 May 1988, A. Wells and P. Suter (NMV); 40♂, 7♀, Baroalba Springs, Kakadu National Park, 12°48'S, 132°49'E, 25 Apr 1991, A. Wells and J. Webber (♀ genitalic prep. PT-1960 figured) (BPBM; NMV; NTMD; RMNH).

Other material examined. 5♂, South Alligator R., UDP falls, 7 Sep 1979, J. Blyth (NMV); 2♂, Graveside Gorge, 18 Jul

1988, P. Dostine (NTMD); 1 ♀, Radon Springs, 12°45'S, 132°55'E, 14 Apr 1989, P. Suter and A. Wells (NTMD).

Description. Colour dark greyish-brown, fore wing median cell open, venation as in Fig. 44. Length of fore wing: ♂ 3.4–3.9 mm; ♀ 3.9–4.3 mm.

Male genitalia (Figs 42, 43) with abdominal sternite IX in lateral view higher than long, subtriangular; superior appendages small, elongate ovoid; paraproctal processes long, distinct, curved ventrad; inferior appendages long, slender, curved dorsad, with outward directed beak-like projection apically, basal margin with several strong bristles. Phallus membranous, with a single internal spine near apex, directed dorsally, and pair of spines near base.

Female genitalia (Figs 45, 46) with ventral plates in lateral view short and broad; sternite VIII subtriangular, elevated mesobasally.

Distribution. Australia, Northern Territory.

Etymology. From *rhamphos* (Greek), "curving beak", referring to the shape of the inferior appendages.

Remarks. This new species is distinguished from others by the presence of a beak-like apicolateral projection on each inferior appendage.

Paranyctiophylax spiculatus sp. nov.

Figures 47–50

Type material. Holotype ♂, Australia, Kimberleys, Mitchell Plateau, Mining Camp Creek, 14°50'S, 125°50'E, 30 Jan 1978, J. E. Bishop (NMV, T-12386). Paratypes: 10 ♂, 4 ♀, collected with holotype (♂ genitalia prep. PT-1995 and ♀ PT-1994 figured) (NMV; RMNII); 11 ♂, 1 ♀, same locality, 31 Jan 1978, J. E. Bishop (ANIC; NMV; QM); 1 ♂, same locality, 26 Feb 1978, J. E. Bishop (NMV); 5 ♂, same locality, 29 Feb 1978, J. E. Bishop (NMV); 1 ♂, same locality, 13 Jul 1978, P. Suter (NMV); 6 ♂, 3 ♀, Mitchell Plateau, Camp creek at crusher, 15 Feb 1979, J. E. Bishop (NMV).

Other material examined. Western Australia, Kimberleys, 1 ♂, Spillway Creek, 2 Feb 1978, J. E. Bishop (NMV); 1 ♂, 1 ♀, Ord River, 9 km N of Kunnanurra, 19 Sep 1979, J. Blyth (NMV); 2 ♂, Theda H.S., Morgan, 28 Sep 1979, J. Blyth (NMV); 1 ♂, Adcock Gorge, Gibb River–Derby Rd, 2 Oct 1979, J. Blyth (NMV); 2 ♂, 1 ♀, Drysdale R. at Kalumbura road crossing, 28 Sep 1979, J. Blyth (NMV); 1 ♂, 2 ♀, Granite Ck, Kunnanurra — Lake Argyle H-way, 2 Feb 1978, J. E. Bishop (NMV); 1 ♂, Pine Springs Ck, between Lake Argyle–Duncan H-way, 23 Feb 1977, J. E. Bishop (NMV); 2 ♂, 1 ♀, King Edward R., 4 May 1992, P. S. Cranston (ANIC, NMV); 9 ♂, 5 ♀, Barnett River Gorge, Barnett Station, 1 Oct 1979, J. Blyth (NMV).

Western Australia, Pilbara, 43 ♂, 13 ♀, Fortescue Falls, Hammersley Range National Park, 27 Oct 1979, J. Blyth

(BPMB, NMV), 2 ♂, Fortescue R., Millstream S of Roebourne, 12 Nov 1978, M. S. and B. J. Moulds (NMV); 2 ♂, Crossing Pool, Millstream, 21 Oct 1979, J. Blyth (NMV); 27 ♂, 6 ♀, Fortescue R., Millstream National Park, 24 Apr 1992, P. S. Cranston (ANIC); 1 ♂, Millstream National Park, Deep Reach, 24 Apr 1992, P. S. Cranston (ANIC); 5 ♂, Lockyer Gorge, Harding River, 19 Oct 1979, J. Blyth (NMV); 3 ♂, 3 ♀, Wittenoom Gorge, 5 km S of Wittenoom, 26 Oct 1979, J. Blyth (NMV); 2 ♂, Wittenoom Gorge, Hammersley Range, 20 Feb 1977, M. S. Moulds (NMV). Northern Territory, 1 ♂, 2 ♀, Howard Creek, 3 km E of Howard Springs, 17 Aug 1979, J. Blyth (NMV).

Description. Colour dark brown, similar in both sexes; wing venation similar to *P. flavus*, fore wing median cell closed. Length of fore wing: ♂ 3.2–4.0 mm; ♀ 3.9–4.4 mm.

Male genitalia (Figs 47, 48) similar to *P. rhamphodes*; sternite IX in lateral view distinctly triangular, distal margin with mesoventral projection; superior appendages elongate ovoid; paraproctal processes strongly curved ventrad, pointed apically; inferior appendages slender, curved, laterally somewhat flattened, base usually gradually widened to distinct elbow, widening sometimes may be rather abrupt, a small hook apically. Phallus with a group of chitinous spines apically.

Female genitalia (Figs 49, 50) with sternite VIII in lateral view transversely depressed, basal mesoventral part forming small, blunt keel.

Distribution. Australia, Kimberley and Pilbara regions of Western Australia.

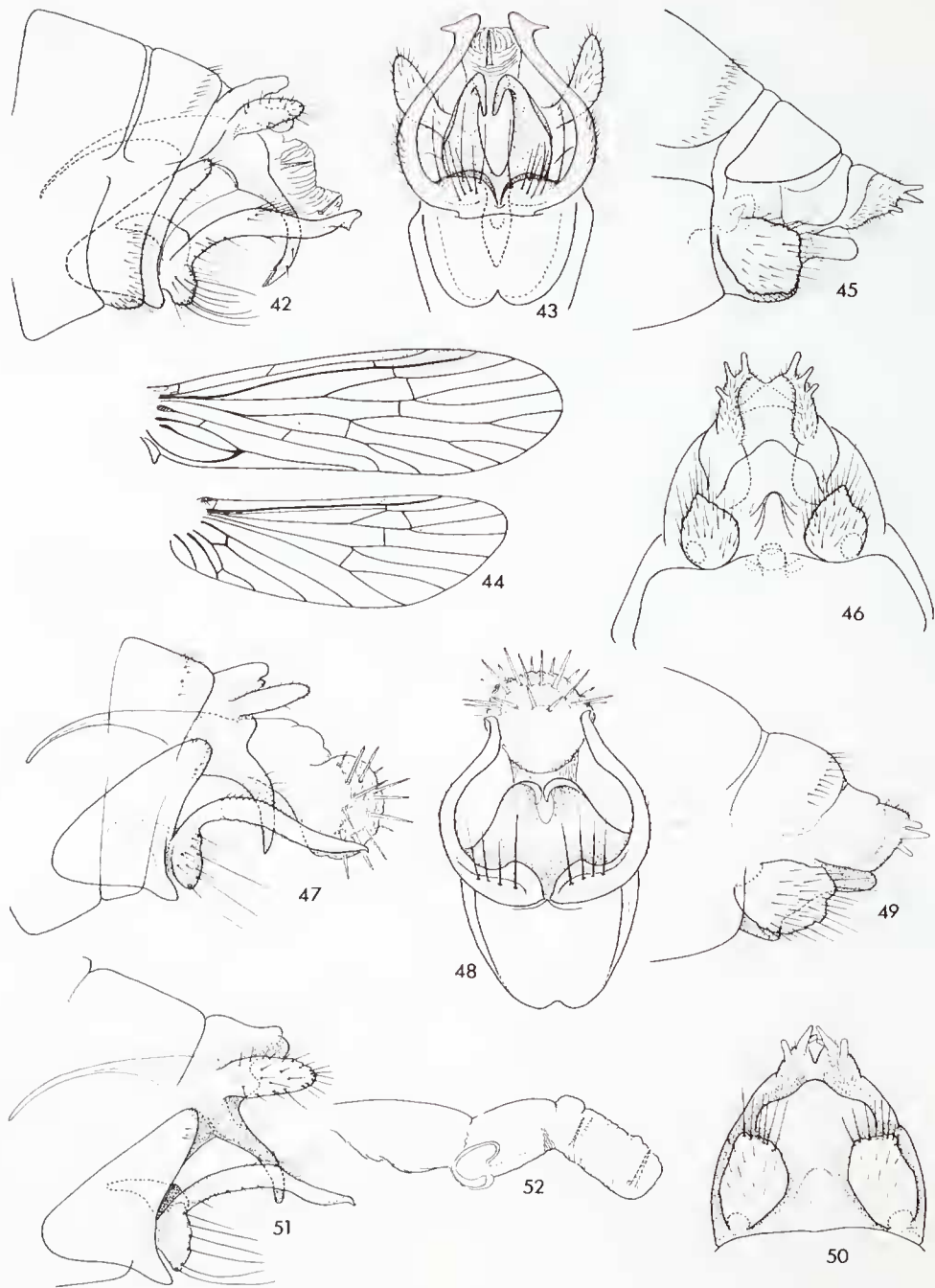
Etymology. From *spica* (Latin), 'spine', in reference to the spines on the phallus.

Remarks. The species is similar to *P. rhamphodes* but may be distinguished by the small apical hook on the inferior appendages and the clavate apex of the phallus with chitinous spines. The specimens from the Pilbara region of Western Australia show minor differences in both male and female genitalia. In males the paraproctal processes are rounded apically and the spines on the phallus are less numerous; in females the meso-ventral keel is less angular.

Paranyctiophylax apicatus sp. nov.

Figures 51, 52

Type material. Holotype ♂, Australia, Cape York Peninsula, Middle Claidie R., Iron Range, 12°46'S, 143°16'E, 2–9 Oct 1974, M. S. Moulds (NMV, T-10134). Paratypes: 1 ♂, collected with holotype (NMV); 2 ♂, same locality, 23 Oct, 1974, M. S. Moulds (♂ genitalia prep. PT-1970 figured) (NMV); 2 ♂, Claidie River 25 km NW of Lockhart River, 12°44'S, 143°16'E, 10 Nov 1988, K. Walker (NMV); 2 ♂,



Figures 42–46, *Paranyctiophylax rhamphodes*: 42, male genitalia lateral; 43, male genitalia ventral; 44, male wing venation; 45, female genitalia lateral; 46, female genitalia ventral.

Figures 47–50, *P. spiculatus*: 47, male genitalia lateral; 48, male genitalia ventral; 49, female genitalia lateral; 50, female genitalia ventral.

Figures 51, 52, *P. apicatus*: 51, male genitalia lateral; 52, apex of phallus lateral.

Dulhunty R. Telegraph crossing, 11°50'S, 142°30'E, 10 Feb 1992, D. Cartwright and A. Wells (QM); 1♂, Tributary of Bertie Ck, 250m SW Heathlands H.S., 11°45'S, 142°35'E, 11 Feb 1992, D. Cartwright and A. Wells (QM); 2♂, Cockatoo Ck Telegraph crossing, 11°39'S, 142°27'E, 5–6 Feb 1992, D. Cartwright and A. Wells (NMV, QM); 1♂, Wenlock River Telegraph crossing, 12°28'S, 142°38'E, 15 Feb 1992, G. Byron and D. Blake (NMV); 4♂, Canal Ck above Eliot Ck junction, 11°23'S, 142°25'E, D. Cartwright and A. Wells (QM, RMNH); 2♂, Gunshot Ck Telegraph crossing, 10–11 Apr 1992, M. Crossland (ANIC).

Other material examined. Australia, Northern Territory, 2♂, South Alligator R. at Gimbat OSS station, 24 Mar 1988, MV–light, A. Wells and P. Suter (NMV, NTMD); 1♂, Groote Eylandt, Amagule Pool, 6 Feb 1984, M. Davies (NMV).

Description. The size and colour similar to other species found in Northern Australia; fore wings with median cell closed. Length of fore wing: ♂ 3.2–3.9 mm.

Male genitalia (Fig. 51) sternite IX in lateral view subtriangular, mesoventral projection present; superior appendages elongate ovoid; paraproctal processes bluntly rounded apically; inferior appendages with small apical hook, basal elbow with several strong bristles. Phallus (Fig. 52) with a single apical spine and a pair of basal spines.

Female not positively associated.

Distribution. Australia, Cape York Peninsula, Northern Territory.

Etymology. Reference to the arrangement of spines inside the phallic apex.

Remarks. This species most closely resembles *P. spiculatus*, differing primarily by the single apical spine of the phallus.

Paranyctiophylax traunensis sp. nov.

Figures 53–57

Type material. Holotype ♂, Papua New Guinea, Baiyer River Sanctuary, Trauna River, 05°35'S, 144°10'E, UV–light, 17 Jun 1986, A. Wells (NMV, T–10744) (♂ genitalic prep. PT–1788 figured). Paratypes: 1♀, Baiyer River, 1150m, 19 Oct 1958, J. L. Gressitt (NMV) (♀ genitalic prep. PT–1953 figured); 2♂, Tifalmin, 1360 m, 19 Aug 1963, R. Straatman (BPBM); 2♂, same locality, 21 Aug 1963, R. Straatman (BPBM); 1♂, same locality, 1400m, 20 Aug 1963, R. Straatman (BPBM); 1♂, Feramin, 1450m 27 Aug 1963, R. Straatman (NMV); 4♂, Mamai Plantation, E of Port Glasgow, 10°16'S, 149°30'E, 150m, 5 Feb 1965, R. Straatman (BPBM, NMV) (All paratypes are dry mounted).

Description. Colour yellowish-brown; fore wing median cell open, hind wing fork 2 with short

footstalk, venation as in Fig. 55. Length of fore wing: ♂ 5.4–5.9 mm; ♀ 5.5 mm.

Male genitalia (Figs 53, 54) with abdominal sternite IX about as long as high, subtriangular, ventral margin produced, broadly rounded; superior appendages in lateral view elongate ovoid, inner margin with large angular lobe; paraproctal processes moderately long, straight, apices obliquely rounded, slightly widened; inferior appendages slender, curved dorsad, basal elbow distinct. Phallus membranous with 2 pairs of internal sclerotised spines.

Female genitalia (Figs 56, 57) sternite VIII forming broad, slightly sclerotised lip.

Distribution. Papua New Guinea.

Etymology. Reference to the type locality.

Remarks. The species may be separated from others by the mesal angular lobe on the superior appendages and the straight paraproctal processes.

Paranyctiophylax synorius sp. nov.

Figures 58–62

Type material. Holotype ♂, Bougainville I., Panguna, 06°10'S, 155°30'E, 7 Dec 1989, C. Yule (NMV, T–10786). Paratypes: 2♀, collected with holotype (♀ genitalic prep. PT–1954 figured); 2♂, same locality, 19 Dec 1989, C. Yule (♂ genitalic prep. PT–1827 figured); 2♀, same locality, 29 Jan 1989, C. Yule (NMV).

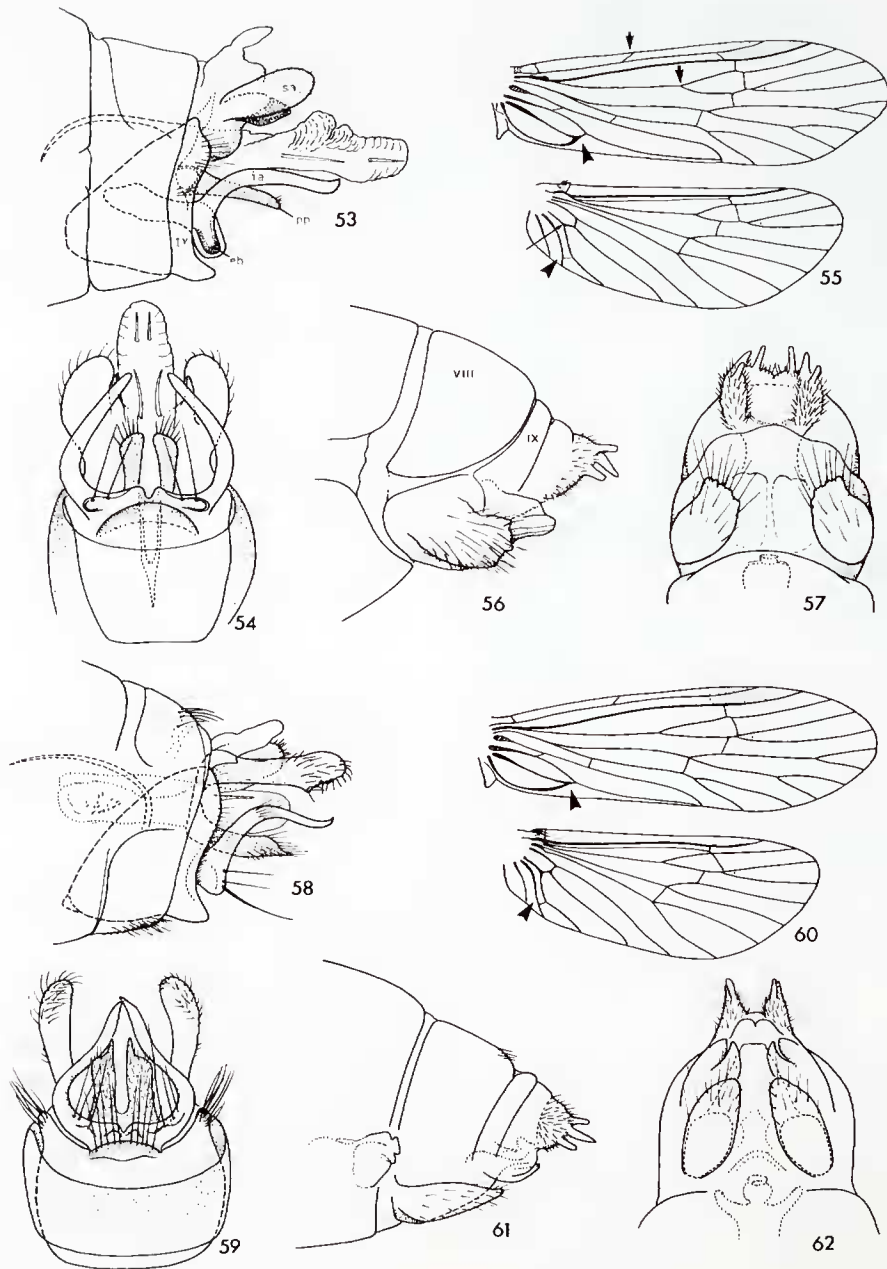
Description. Dark greyish-brown, fore wings with median cell open, venation as in Fig. 60. Length of fore wing: ♂ 5.2–5.4 mm; ♀ 5.9–6.2 mm.

Male genitalia (Figs 58, 59) abdominal sternite IX in lateral view robust, distomesal margin forming slightly produced lip; superior appendages straight, slightly clavate; paraproctal processes slightly curved dorsally, mesodistal angle acutely produced, directed posteriorly; inferior appendages slender, strongly curved, each with strong dark bristle at the base of elbow. Phallus with pair of sclerotized spines apically and a group of small spinules on phallobase.

Female genitalia (Figs 61, 62) with ventral plates elongate ovoid, rather close ventrally; sternite VIII with mesal lip truncate, flanked by 'tusk-like' lobes.

Distribution. Bougainville Island.

Etymology. From *synoria* (Greek), 'borderland' in reference to the most easterly location.



Figures 53–57, *Paranyctiophylax traunensis*: 53, male genitalia lateral; 54, male genitalia ventral; 55, male wing venation; 56, female genitalia lateral; 57, female genitalia ventral.
 Figures 58–62, *P. synorius*: 58, male genitalia lateral; 59, male genitalia ventral; 60, male wing venation; 61, female genitalia lateral; 62, female genitalia ventral.

Remarks. The species is distinguished from other species by the distinct paraproctal processes and a group of spinules on the phallobase.

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